

## Review Article

# A systematic review of structured compared with non-structured breastfeeding programmes to support the initiation and duration of exclusive and any breastfeeding in acute and primary health care settings

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## Abstract

Policies and guidelines have recommended that structured programmes to support breastfeeding should be introduced. The objective of this review was to consider the evidence of outcomes of structured compared with non-structured breastfeeding programmes in acute maternity care settings to support initiation and duration of exclusive breastfeeding. Quantitative and qualitative studies were considered. Primary outcomes of interest were initiation of breastfeeding and duration of exclusive breastfeeding. Studies that only considered community-based interventions were excluded. An extensive search of literature published in 1992–2010 was undertaken using identified key words and index terms. Methodological quality was assessed using checklists developed by the Joanna Briggs Institute. Two independent reviewers conducted critical appraisal and data extraction; 26 articles were included. Because of clinical and methodological heterogeneity of study designs, it was not possible to combine studies or individual outcomes in meta-analyses. Most studies found a statistically significant improvement in breastfeeding initiation following introduction of a structured breastfeeding programme, although effect sizes varied. The impact on the duration of exclusive breastfeeding and duration of any breastfeeding to 6 months was also evident, although not all studies found statistically significant differences. Despite poor overall study quality, structured programmes compared with standard care positively influence the initiation and duration of exclusive breastfeeding and any breastfeeding. In health care settings with low breastfeeding initiation and duration rates, structured programmes may have a greater benefit. Few studies controlled for any potential confounding factors, and the impact of bias has to be considered.

**Keywords:** breastfeeding initiation and duration, exclusive breastfeeding, Baby-Friendly Hospital Initiative, support for breastfeeding, infant nutrition, systematic review.

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## Introduction

There is a growing body of evidence to support numerous short- and longer-term health benefits of exclusive breastfeeding and increased recognition at global policy level of the importance of breastfeeding for child health (World Health Organization 2007; Quigley *et al.* 2007). The introduction of structured

programmes into acute health care settings to support women who wish to breastfeed, such as the Baby-Friendly Hospital Initiative (BFHI) underpinned by the 10 Steps to Successful Breastfeeding (World Health Organization & UNICEF 1989), has been shown to increase breastfeeding initiation and duration in several countries, including developed, middle income and developing countries (Kramer *et al.* 2001;

Bartington *et al.* 2006). However, methodological issues such as loss to follow-up, failure to adjust for confounding factors, lack of information on women's or clinicians' views of programmes and limited descriptions of the context of care, limit validity and generalisability. In addition, the longer-term benefits of introducing structured programmes are unknown.

Low initiation and early cessation of breastfeeding are prevalent in many countries. The WHO/UNICEF BFHI, launched in 1992 is a global programme which works with health service providers, clinicians and women to ensure all women and their babies receive the health and social benefits of breastfeeding. A 10-step programme has been developed to promote and support breastfeeding, which includes specific practice and organisational recommendations that maternity units should achieve (Box 1). The programme has been implemented in individual maternity hospitals in a number of developed, middle income and developing countries. In addition to international programmes such as BFHI, country-specific programmes to improve and sustain breastfeeding have also been developed and implemented (Baker *et al.* 2006).

There is some evidence that the introduction of programmes such as the BFHI is associated with an increase in the initiation of breastfeeding, but limited information on: duration of exclusive breastfeeding; whether BFHI and other initiatives are more likely to be associated with increased breastfeeding initiation and duration in particular health care settings and country contexts; or if programmes are more likely to benefit specific groups of women. The costs of implementing and sustaining programmes, particularly if

### Box 1. Ten steps to successful breastfeeding

Every facility providing maternity services and care for newborn infants should:

1. have a written breastfeeding policy that is routinely communicated to all health care staff,
2. train all health care staff in skills necessary to implement this policy,
3. inform all pregnant women about the benefits and management of breastfeeding,
4. help mothers initiate breastfeeding within half an hour of birth,
5. show mothers how to breastfeed and how to maintain lactation even if they should be separated from their infants,
6. give newborn infants no food or drink other than breast milk, unless medically indicated,
7. practise rooming-in – that is, allow mothers and infants to remain together – 24 h a day,
8. encourage breastfeeding on demand,
9. give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants, and
10. foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

**Source:** *Protecting, Promoting and Supporting Breastfeeding: The Special Role of Maternity Services*, a joint WHO/UNICEF statement published by the WHO 1989.

additional staff training has to be undertaken, is also an issue that has to be addressed by health care providers and balanced against the potential for reducing future health service demands (National Institute for Health and Clinical Excellence 2006).

## Objectives

To assess whether a structured programme such as the WHO/UNICEF BFHI implemented in maternity

### Key messages

- Acute maternity care settings should implement structured programmes to support breastfeeding initiation and the duration of exclusive and any breastfeeding.
- The content of programmes could replicate an existing programme, such as BFHI, in full or in part, or be specifically developed to reflect local needs.
- Further high quality RCTs are needed to address the impact of the introduction of structured programmes including the influence on breastfeeding to 6 months.
- Trial interventions need to be well defined and implementation processes described to inform reproducibility across different locations and different country settings.
- Prospective data capture to inform economic analyses should be undertaken.

acute care settings is more likely to be associated with higher rates of initiation and duration of exclusive breastfeeding than no structured programme (Beake *et al.* 2011). 'Structured programme' included a multifaceted approach to support breastfeeding that targeted change at organisational, service delivery and individual behaviour levels, for example implementation of the 10 steps of the BFHI.

## Methods

The review included any relevant published or unpublished studies undertaken between 1992, when the BFHI was launched, and 2010. Quantitative and qualitative studies that focused on programmes to support the initiation and duration of exclusive breastfeeding implemented in the hospital setting were included. Studies were excluded if they only evaluated the UNICEF UK Baby Friendly Initiative (Community) Initiative (Seven Point Plan) developed by UNICEF UK in 1998 as the aim of the review was to assess structured programmes that included support from initiation of breastfeeding. Participants included pregnant women and mothers of newborn infants in hospital.

## Outcome measures

Primary outcome measures were:

- rates of initiation of breastfeeding; and
- duration of any breastfeeding and/or exclusive breastfeeding.

Secondary outcome measures were:

- maternal and infant health outcomes;
- women's knowledge, attitudes and skills following introduction of a structured programme;
- staff knowledge, attitudes and skills following introduction of a structured programme;
- women's experiences of support (professional and peer) for breastfeeding;
- breastfeeding problems; and
- impact on health care resources.

## Search strategy

A search strategy was developed to identify all published and unpublished quantitative and qualitative studies. Studies were restricted to those published in English. Optimal search terms were initially identified using CINAHL, MEDLINE. Key words, MeSH, thesaurus and free-text terms were then searched using the following databases from 1992 to 2010: CINAHL, MEDLINE (via Ovid), Cochrane Library, Centre for Research and Dissemination databases (National Health Service Economic Evaluation Database (NHS EED), Health Technology Assessment and link to National Research Register), Database of Abstracts of Reviews of Effect, EMBASE, PubMed, Social Sciences Index, Web of Knowledge/Web of Science, MIDIRS and PsycINFO. Hand searches of reference lists of all identified reports and articles were searched for additional studies. All identified studies were assessed for relevance based on study title, abstract and descriptor/MeSH term. Following the initial search, two reviewers, with the assistance of the associate reviewers, independently assessed the studies against the inclusion criteria. The reviewers independently reviewed all papers for methodological quality and conferred. Discrepancies were resolved by discussion and where agreement could not be reached, associate reviewers were asked for their opinion. All stages of the review development were undertaken and managed using the Joanna Briggs Institute Comprehensive Review Management System (JBI CRMS). The appropriate JBI critical appraisal tools were used based on methodology/method of the selected paper, for example the Qualitative Assessment and Review Instrument (QUARI) for qualitative studies. The critical appraisal tools include a number of criteria against which the quality of the study can be assessed. If a study failed to meet these criteria, for example for qualitative studies if there was poor congruity between the research methods and the research question or objectives, the study was excluded.

As there were no comparable randomised controlled trials (RCTs) identified, and as quantitative data could not be statistically combined for a meta-analysis, extracted data were synthesised into a

narrative summary. There was wide clinical heterogeneity, with studies comparing different interventions with different outcome measures and timing of assessment. The characteristics of the included studies and reviews are presented in Tables 1–6.

## Results

A total of 990 articles were identified from the initial database search and their titles reviewed (Fig. 1), with 120 articles identified as relevant to the aims of the review. No unpublished studies were found. The abstracts of these papers were independently assessed by two reviewers to see if they met inclusion criteria for the review. The full text of 72 papers were retrieved and assessed further to confirm if they met inclusion criteria and a further 21 articles excluded. No qualitative studies met the inclusion criteria. The remaining 51 articles were then appraised by SB, DB and CP independently. Following this, 25 studies were excluded. A total of 26 articles were included in the review including one RCT, two controlled trials, one cross-sectional study, two descriptive studies, 15 cohort studies and five systematic reviews. The full details of the review process are available through the Joanna Briggs Institute (<http://www.joannabriggs.edu.au>).

Many of the excluded studies were small and poorly conducted. Most of the included studies were small observational before and after studies. Only one RCT was included (Kramer *et al.* 2001, a cluster RCT) and two non-RCTs (Cattaneo & Buzzetti 2001; Coutinho *et al.* 2005). There was poor homogeneity between included studies with a wide variety of outcomes measured, timing of assessment and little consistency in the interventions implemented. Not all studies controlled for potential confounding factors such as maternal socio-economic status, parity and age, and many used retrospective data that may have introduced bias into study findings.

The five systematic reviews included (Fairbank *et al.* 2000; DeMott *et al.* 2006; Britton *et al.* 2007; Hannula *et al.* 2008; Spiby *et al.* 2009) were well conducted and had good internal validity with adequate approaches to minimise bias; however, they also included small before and after studies.

For most of the studies included, the structured programme of interest reflected all 10 steps of the BFHI, selected components of the BFHI or a specifically developed local programme. There was little consistency in the type of structured support intervention described. Studies included BFHI-accredited, BFHI, BFHI models, low vs. high number of BFHI steps, BFHI training only, or training or breastfeeding promotion 'similar' (as defined by the study authors) to BFHI. Ten different time periods were identified for data collection on breastfeeding uptake and a further nine for duration of exclusive breastfeeding. Only five studies (Cattaneo & Buzzetti 2001; Kramer *et al.* 2001; Dulon *et al.* 2003; Shinwell *et al.* 2006; Duyan Camurdan *et al.* 2007) collated data on breastfeeding duration at 6 months post-birth. Description of breastfeeding included breastfeeding, exclusive breastfeeding, predominately breastfeeding, fully breastfeeding, completely breastfeeding, partially breastfeeding, any breastfeeding and breastfeeding to any degree. Few studies (Wright *et al.* 1996; Zimmerman 1999; Cattaneo & Buzzetti 2001; Kramer *et al.* 2001; Labarere *et al.* 2003; Gau 2004; DeMott *et al.* 2006) present data on any of the secondary outcomes of interest.

Given the range of outcome measures and wide variation in timing of assessment of the outcomes of interest, outcomes are presented by: initiation of breastfeeding, breastfeeding up to 1 week, up to 2 months, up to 6 months, at 6 months and duration of exclusive breastfeeding. If socio-demographic details of study participants were reported, these are also presented in the text.

## Primary outcomes

### Initiation of breastfeeding

Nine studies evaluated the initiation of breastfeeding (Wright *et al.* 1996; Philipp *et al.* 2001; Wagner *et al.* 2002; Dulon *et al.* 2003; Weng *et al.* 2003; Coutinho *et al.* 2005; Bartington *et al.* 2006; Shinwell *et al.* 2006; Rosenberg *et al.* 2008). Seven studies found a statistically significant improvement in the initiation of breastfeeding post-intervention (Philipp *et al.* 2001; Wagner *et al.* 2002; Weng *et al.* 2003; Coutinho *et al.*

**Table 1.** Breastfeeding initiation

Study	Design	Participants	Method	Intervention	Results	Comments
Bartington <i>et al.</i> 2006 (United Kingdom)	Cohort	17 359 infants	Interview at 9 months	BFHI-accredited unit vs. standard unit	10% more likely to start breastfeeding in accredited unit than unit with no award; adjusted RR 1.10 (95% CI 1.05–1.15)	Large study. Millennium Cohort study evaluation of BFHI
Coutinho <i>et al.</i> 2005 (Brazil)	Non-randomised trial	Pre-intervention 364 infants vs. study 350 infants. >half mothers below poverty line and 25% illiterate	Interviews	BFHI training vs. no BFHI training	1. Improvement in exclusive breastfeeding in hospital; 70% vs. 21% ( $P < 0.0001$ ) 2. Increase in partial breastfeeding on day 1: 81% vs. 70% ( $P < 0.009$ )	Hospitals did not have BFI status, intervention staff BFHI training of 18 h. Paper also looked at BFHI training with home visits
Dulon <i>et al.</i> 2003 (Germany)	Descriptive	1 487 mothers	Telephone interviews	BFHI high (>5 BFHI steps) vs. low BFHI (<5 BFHI steps)	No statistically significant difference at birth. 91.3% vs. 90.0% ( $P = 0.415$ )	Used breastfeeding index to assess hospitals against items identical to 10 steps; high >5 steps or low = to or <5 steps
Philipp <i>et al.</i> 2001 (United States)	Cohort	200 infants (3 years pre-BFHI policies) vs. 200 infants (after BFHI policies); inner city teaching hospital	Notes review	BFHI accredited vs. standard care	Increased breastfeeding rates: 1. Any breastfeeding: 58% vs. 86.5% 2. Exclusive breastfeeding: 5.5% vs. 33.5%	
Rosenberg <i>et al.</i> 2008 (United States)	Cohort	57 hospitals	Survey of hospitals	Low compliance with 10 Steps vs. high compliance	Increase in breastfeeding percentage ( $P = 0.021$ )	No data available. Data self-reported by a single person from each hospital.
Shinwell <i>et al.</i> 2006 (Israel)	Cohort	Pre-intervention 471 infants vs. study 364 infants; middle class area	Questionnaire day 1/2	Staff training vs. no staff training	Increased breastfeeding rates: 84% vs. 93% ( $P < 0.0001$ )	32-h course (not BFHI course)
Wagner <i>et al.</i> 2002 (United States)	Cohort	4 315 vs. 8 724 infants	Notes review	Staff and parent training (not BFHI) vs. no staff & parent training	Increased breastfeeding rates; 18.9% vs. 47.1% ( $P < 0.0001$ )	Training for all health care providers (non-BFHI)
Weng <i>et al.</i> 2003 (Taiwan)	Cohort	1 741 vs. 5 338 infants (in 56 hospitals), 36 passed, 18 failed appraisal	Survey on PN ward	BFHI accredited vs. not BFHI accredited	Increased breastfeeding rates in hospital. 1. Total breastfeeding rates: 88.1% vs. 78.1% ( $P < 0.001$ ) 2. Exclusive breastfeeding rates: 31% vs. 23% ( $P < 0.001$ )	Compares data from hospitals that passed the BFHI assessment with those that did not; all hospitals were assessed.
Wright <i>et al.</i> 1996 (United States)	Cohort	Pre-BFHI policy 192 women vs. post-BFHI policy change 392 women	Interview on PN ward	BFHI model vs. no BFHI model	No statistically significant difference; 69.9% vs. 73.6%	Introduced BFHI steps, not BFHI accredited

**Table 2.** Breastfeeding up to 1 week

Study	Design	Participants	Method	Intervention	Results	Comments
Broadfoot <i>et al.</i> 2005 (United Kingdom)	Cohort	464 246 infants	Observational study using routinely collected breastfeeding data at 7 days	BFHI accredited vs. no BFHI accreditation	More likely to be breastfed. 41.1% vs. 52.5% mean breastfeeding rate. 28% more likely ( $P < 0.001$ ) after adjustment for socio-economic factors.	Large study including all babies born in Scotland between 2002 and 1995
Cattaneo & Buzzetti 2001 (Italy)	Controlled, non-randomised trial	2 669 mother-infant pairs 571 health workers	Interviews at discharge	BFHI training vs. no BFHI trial.	Significant increase in exclusive breastfeeding at discharge. 41% vs. 77% (group 1) 23% vs. 73% (group 2)	Slightly adapted 18-h training UNICEF course
Gau 2004 (Taiwan)	Cohort	Experimental group 3 327; control group 1 254	Questionnaires	BFHI model vs. no BFHI model	Increased breastfeeding rates. 1. 92–95% vs. 82–95% any breastfeeding ( $P < 0.001$ ) 2. 30–50% vs. 22–25% exclusive breastfeeding ( $P < 0.001$ )	Intervention a Lactation Intervention Programme based on BFHI, but not fully. Response rate unclear.
Labaree <i>et al.</i> 2003 (France)	Cohort	Pre-intervention 323 infants vs. post-intervention 324 infants	Retrospective study; data collected from case notes	Staff training (not BFHI) vs. no staff training	Increased rate in exclusive breastfeeding. 15.8% vs. 35.2% ( $P < 0.01$ )	3-day training, no AN component, not BFHI.
Tappin <i>et al.</i> 2001 (United Kingdom)	Cohort	131 759 infants 1990/1991 and 118 055 infants in 1997/1998	Routine breastfeeding data collected at 7 days	BFHI accredited vs. not BFHI accredited	Increased rate in breastfeeding 36% vs. 44% (95% CI 7.0, 9.2)	Large Scottish study comparing 1997 vs. 1990
Zimmerman 1999 (United States)	Cohort	Pre-intervention 188 infants vs. post-intervention 405 infants; low-income women	Routine breastfeeding data collected at discharge	Education & support of mothers vs. no education & support	Increased rate of any/exclusive breastfeeding. 1. 50% vs. 67%, $P < 0.05$ any breastfeeding 2. 36% vs. 55%, $P < 0.05$ exclusive breastfeeding	Education of women, gift packs, etc. Initiation taken as figures at discharge. Figures in table not the same as those claimed in abstract.

Table 3. Breastfeeding up to 2 months

Study	Design	Participants	Method	Intervention	Results	Comments
Bartington <i>et al.</i> 2006 (United Kingdom)	Cohort	17 359 infants	Interview at 9 months	BFHI accredited unit vs. standard unit	Not more likely to breastfeed at 1 month after adjustment for social, demographic & obstetric factors (95% CI 0.84–1.09)	Large study – Part of Millennium Cohort study that included evaluation of BFHI
Braun <i>et al.</i> 2003 (Brazil)	Cohort	Pre-BFHI 187 vs. post-BFHI 250 infants	Interviews	BFHI vs. standard care	Higher rates of breastfeeding. Median duration of exclusive breastfeeding 2 months vs. 1 month. Hazard ratio 1.66 (95% CI 1.40–1.98) for not breastfeeding exclusively at 1 month	Small study; effects of BFHI stronger in underprivileged population
Coutinho <i>et al.</i> 2005 (Brazil)	Cohort	Pre-intervention 364 infants vs. study 350 infants. >half mothers below poverty line and 25% illiterate	Interviews	BFHI training vs. no BFHI training	No difference comparing hospital training with no hospital training (difference noted with home visits). Only 26 (15%) of 168 infants exclusively breastfeeding at 30 days.	Hospitals did not have BFI status, intervention staff BFHI training of 18 h. Paper also looked at BFHI training with home visits. High rates of exclusive breastfeeding rates in hospital short lived, at 10 days only 30% exclusively breastfeeding and at 1 month 15%.
Duyan Camurdan <i>et al.</i> 2007 (Turkey)	Descriptive	Pre-BFHI 258 infants vs. post-BFHI 297 infants	Interview	BFHI accreditation vs. standard care	1. Higher rates of breastfeeding at 2 weeks 93% vs. 97% (not statistically significant) 2. Higher rates of breastfeeding at 2 months 67% vs. 76% (not statistically significant)	Lactation Intervention Programme based on BFHI, but not fully.
Gau 2004 (Taiwan)	Cohort	Experimental group 3 327; control group 1 254	Questionnaires	BFHI model vs. no BFHI model	1. Higher rate of breastfeeding at 2 weeks 45–51% vs. 42–44% $P < 0.001$ 2. Higher rates of exclusive breastfeeding at 2 weeks 18–26% vs. 8–5% $P < 0.001$ 3. Higher rates of breastfeeding at 1 month 19–21% vs. 23–30% $P < 0.001$ 4. Higher rates of exclusive breastfeeding at 1 month 30–34% vs. 35–44% $P < 0.001$ 5. Higher rates of breastfeeding at 2 months 5–11% vs. 2–11% $P < 0.001$ 6. Higher rates of exclusive breastfeeding at 8 weeks 6–12% vs. 0–5% $P < 0.001$	
Lutter <i>et al.</i> 1997 (Brazil)	Cohort	Programme hospital 236 women vs. control hospital 206 women	Discharge questionnaire and follow-up interviews	Breastfeeding programme vs. no breastfeeding programme	Increase in exclusive breastfeeding at 1 month (64% vs. 39%)	Programme included; rooming-in, early initiation of breastfeeding, breastfeeding assistance and talks during hospitalization
Rosenberg <i>et al.</i> 2008 (United States)	Cross-sectional	57 hospitals	Survey of hospitals	Low compliance with 10 Steps vs. high compliance	Increase in breastfeeding percentage ( $P = 0.011$ )	No data available. Data self-reported by a single person from each hospital.
Weng <i>et al.</i> 2003 (Taiwan)	Cohort	1 741 vs. 5 338 infants (in 56 hospitals). 36 passed, 18 failed appraisal	Survey on PN ward	BFHI accredited vs. not BFHI accredited	1. Higher rates of breastfeeding at 1 month 67.6% vs. 59.4% 2. Higher rates of exclusive breastfeeding at 1 month 18.79% vs. 26.11%	Taiwan, compares data from hospitals that passed the BFHI assessment with those that did not; all hospitals were assessed for BFHI.
Zimmerman 1999 (United States)	Cohort	Pre-intervention 188 infants vs. post-intervention 405 infants; low-income women	Routine breastfeeding data collected at discharge	Education & support of mothers vs. no education & support	Increased rate of any/exclusive breastfeeding. 1. 35% vs. 57%, $P < 0.05$ any breastfeeding 2. 20% vs. 30%, $P < 0.05$ exclusive breastfeeding	Education of women, gift packs, etc. Initiation taken as figures at discharge. Figures in table not the same as those claimed in abstract.



**Table 4.** Breastfeeding up to 5 months

Study	Design	Participants	Method	Intervention	Results	Comments
Braun <i>et al.</i> 2003 (Brazil)	Cohort	Pre-BFHI 187 vs. post-BFHI 250 infants	Interviews	BFHI vs. standard care	Cox regression analysis showed hazard ratio was: 1. 1.55 CI 1.16–2.01 for discontinuing any breastfeeding at 4 months 2. 1.66 CI = 1.40–1.98 for not breastfeeding exclusively at 1 month	Small study; BFHI more effective in under privileged infants
Caldeira & Goncalves 2007 (Brazil)	Cohort	Pre-study 494 infants vs. 1 240 study infants	Interviews	BFHI accredited vs. standard care	Increased duration of exclusive breastfeeding at 4 months. Median exclusive breastfeeding duration raised from 27 days to 3.5 months	
Cattaneo & Buzzetti 2001 (Italy)	Controlled, non-randomised trial	2 669 mother–infant pairs 571 health workers	Interviews at discharge	BFHI training vs. no BFHI trial	Significantly increased rates of full breastfeeding at 3 months 37% vs. 50% (group 1) 40% vs. 59% (group 2)	
Dulon <i>et al.</i> 2003 (Germany)	Descriptive	1 487 mothers	Telephone interviews	BFHI high (>5 BFHI steps) vs. low BFHI (<5 BFHI steps)	Significant increased association for full breastfeeding. 42.1% vs. 49.5% ( $P = 0.005$ )	Used breastfeeding index to assess hospitals against items identical to 10 steps; high >5 steps or low = to or <5 steps
Duyan Camurdan <i>et al.</i> 2007 (Turkey)	Descriptive	Pre-BFHI 258 infants vs. post-BFHI 297 infants	Interview	BFHI accreditation vs. standard care	Increased rates of exclusive breastfeeding at 4 months. 45.6% vs. 53.7% (not statistically significant)	
Kramer <i>et al.</i> 2001 (Belarus)	RCT	17 046 infants	Data collected at regular clinic appointments by paed	BFHI model vs. no BFHI model	1. More likely to exclusively breastfeed at 3 months 43.3% vs. 6.4% ( $P < 0.001$ ) 2. Twice as many predominately breastfeeding at 3 months 51.9% vs. 28.3% OR 0.28; (0.16–0.49) 3. Increased rates of breastfeeding to any degree at 3 months 49.8% vs. 36.1% OR 0.52 (0.39–0.71)	PROBIT modelled on BFHI
Merten <i>et al.</i> 2005 (Switzerland) <sup>45</sup>	Descriptive	2 861 infants (1 142 in BFHI hospital)	Questionnaires compared babies born in BFHI designated units with non-designated BFHI units	BFHI vs. standard care	1. Increased rates of exclusive breastfeeding 0–3 months 60% vs. 49% ( $P 0.033$ ) 2. Increased rates of exclusive breastfeeding 0–5 months 42% vs. 34% ( $P 0.022$ ) 3. Increased rates of full breastfeeding 0–3 months 72% vs. 60% ( $P 0.012$ ) 4. Increased rates of full breastfeeding 0–5 months 51% vs. 42% ( $P 0.015$ )	National study



**Table 5.** Breastfeeding at 6 months

Study	Design	Participants	Method	Intervention	Results	Comments
Cattaneo & Buzzetti 2001 (Italy)	Controlled, non-randomised trial	2 669 mother–infant pairs 571 health workers	Interviews at discharge	BFHI training vs. no BFHI trial	Significantly increased rate of any breastfeeding, 43% vs. 62% (group 1) 41% vs. 64% (group 2)	Slightly adapted 18-h training UNICEF course
Dulon <i>et al.</i> 2003 (Germany)	Descriptive	1 487 mothers	Telephone interviews	BFHI high (>5 BFHI steps) vs. low BFHI (<5 BFHI steps)	Significant association with full (exclusive) breastfeeding, 10.8% vs. 15.7% ( <i>P</i> -value 0.006)	Used breastfeeding index to assess hospitals against items identical to 10 steps; high >5 steps or low = to or <5 steps
Duyan Camurdan <i>et al.</i> 2007 (Turkey)	Descriptive	Pre-BFHI 258 infants vs. post-BFHI 297 infants	Interview	BFHI accreditation vs. standard care	No difference in exclusive breastfeeding rates; 9.8% vs. 9.3%	Comparing before and after BFHI
Kramer <i>et al.</i> 2001 (Belarus)	RCT	17 046 infants	Data collected at regular clinic appointments by paed	BFHI model vs. no BFHI model	1. More likely to exclusively breastfeed 0.6% vs. 7.9% ( <i>P</i> = 0.01) 2. More likely to predominantly breastfeed 1.6% vs. 10.6% ( <i>P</i> = 0.003) 3. More likely to breastfeed to any degree 36.1% vs. 49.8% (OR 0.52, CI 0.39–0.71)	PROBIT modelled on BFHI
Shinwell <i>et al.</i> 2006 (Israel)	Cohort	Pre-intervention study 471 infants vs. study 364 infants; middle class area	Questionnaire day 1/2	Staff training vs. no staff training	More likely to be completely breastfeeding, 26% vs. 47% <i>P</i> = 0.0001 (ERR 1.81 CI 1.50, 2.19)	32-h course (not BFHI course)

**Table 6.** Literature reviews included

Study	Design	Number of studies/ participants	Aim	Results/conclusions	Authors' comments
Britton <i>et al.</i> 2007	Systematic review including randomised and quasi-randomised controlled trials	24 studies 29 385 mother–infant pairs	Comparing extra support for breastfeeding mothers with usual care	<p>All forms of extra support analysed together showed an increase in duration of any breastfeeding (RR for stopping any breastfeeding before 6 months 0.19, 95% CI 0.86 to 0.96).</p> <p>All forms of extra support together had a larger effect on duration of exclusive breastfeeding than any other breastfeeding (RR 0.81, 95% CI 0.74 to 0.89)</p> <p>Lay and professional support together extended duration of any breastfeeding significantly (RR before 4–6 weeks 0.65, 95% 0.51 to 0.82; RR before 2 months 0.74, 95% CI 0.66 to 0.83).</p> <p>Exclusive breastfeeding was significantly longer with use of WHO/UNICEF training (RR 0.69, 95% CI 0.52 to 0.91). Women who received any form of support were less likely to give up exclusive breastfeeding before 5 months.</p>	<p>Additional professional support was effective in prolonging any breastfeeding, but its effects on exclusive breastfeeding were less clear.</p> <p>WHO/UNICEF training courses appeared to be effective for professional training.</p> <p>Additional lay support was effective in prolonging exclusive breastfeeding, while its effects on duration of any breastfeeding were uncertain.</p>
Fairbank <i>et al.</i> 2000	Systematic review including RCTs, non-RCTs and before–after studies	59 studies	To evaluate the effectiveness of interventions to promote the initiation of breastfeeding	<p>Interventions that increased initiation and duration of breastfeeding:</p> <p>Institutional changes to hospital practices either as part of or independent of BFHI (particularly in developing countries)</p> <p>Use of peer support as a stand alone intervention for women in low-income groups who wanted to breastfeed. Interventions offering limited impact:</p> <p>Social support interventions and use of literature alone</p> <p>No significant change found with:</p> <p>Training programmes did not result in the attitudes of staff or breastfeeding rates.</p>	<p>Packages of interventions have been shown to be effective in increasing the initiation and in most cases duration of breastfeeding in developed countries.</p> <p>Effective packages include peer support programmes combined with structural changes to the health sector and/or health education.</p>
Spiby <i>et al.</i> 2009	Systematic review including before–after designs; no RCTs	Nine studies; all studies related to health professionals. No studies identified related to breastfeeding counsellors.	To examine the effects of training, education and practice interventions with health professionals and lay feeding counsellors on duration of breastfeeding	<p>Evidence from studies insufficient to draw conclusions.</p> <p>From one study – BFHI training might have the potential to influence breastfeeding duration.</p>	<p>Many of the studies had methodological limitations. Study settings and context varied and lacked comparability.</p>
Hannula <i>et al.</i> 2008	Systematic review	36 studies	Professional support interventions for breastfeeding and how effective interventions are in supporting breastfeeding	<p>Interventions from pregnancy to intra-partum care and throughout the post-natal period more effective than interventions that focused on a shorter time period. Multifaceted intervention packages were more effective than single interventions if they included education and support from 'well trained' professionals.</p> <p>Recommends all maternity care providers should implement an externally evaluated structured programme that encourages breastfeeding, using BFI as a minimum standard.</p>	<p>During pregnancy, the effective interventions were interactive, involving mothers in conversation. BFHI as well as practical hands-off teaching combined with support and encouragement effective approaches.</p> <p>Further research to evaluate the cost-effectiveness of BFI compared with another programme, or to standard care, should be carried out.</p>
DeMott <i>et al.</i> 2006	Review of literature plus further economic investigation	Six studies included in literature review. Economic evaluation included eight maternity units.	Address the question: What is the impact of the use of the Baby Friendly Initiative on breastfeeding uptake and duration in English and Welsh hospitals and community settings?		

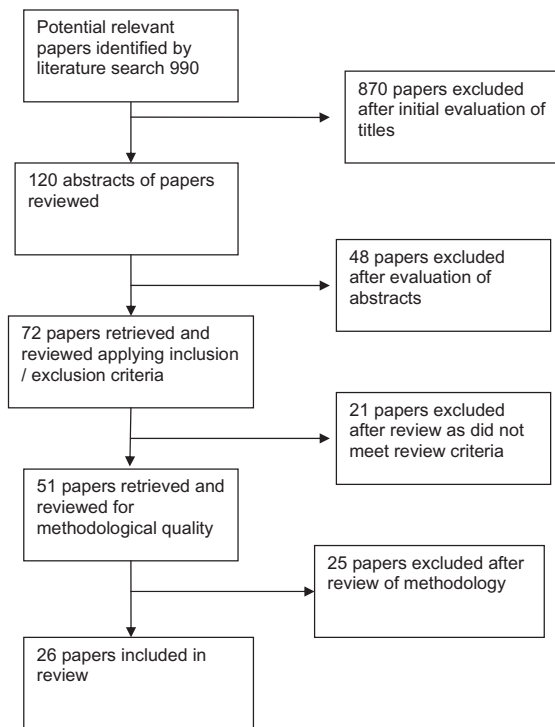


Fig. 1. Flow chart of stages of searching.

2005; Bartington *et al.* 2006; Shinwell *et al.* 2006; Rosenberg *et al.* 2008), while two showed no significant difference (Wright *et al.* 1996; Dulon *et al.* 2003) (see Table 1).

Bartington *et al.* (2006) was based on data obtained as part of the Millennium Cohort Study, a large UK-wide study of social, economic and health-related circumstances of families and their infants born over a 1-year period between September 2000 and September 2001. The study aims included determining whether babies born in a BFHI-accredited hospital had higher breastfeeding initiation rates. The study included 17 359 mother–infant pairs, with multiple births excluded. After adjustment for country of residence and social, demographic and obstetric characteristics, women giving birth in a BFHI-accredited unit were 10% more likely to initiate breastfeeding than women who gave birth in a unit that did not have accreditation [adjusted RR 1.10 95% confidence interval (CI) 1.05–1.15].

Philipp *et al.* (2001) in a small study from the United States, compared the breastfeeding initiation

rates among 200 infants in 1995, before the implementation of the BFHI 10 steps, with the breastfeeding initiation rates of 200 infants in 1999 after the introduction of BFHI 10 steps and the year the unit was designated BFHI. A review of hospital records found a significant increase in breastfeeding initiation rates between the two time periods (58% vs. 86.5%).

Weng *et al.* (2003) compared the outcome of appraisal of hospital support for breastfeeding in line with BFHI on breastfeeding initiation in Taiwan, and assessed factors related to achieving BFHI accreditation. The study included 56 hospitals including private and public facilities registered to be appraised in line with the BFHI 10 steps, although some steps were revised in order to reflect service content and provision in Taiwan. Thirty-eight units that passed the appraisal (data available on 5338 infants in hospital) were compared with 18 units that failed the appraisal (data available on 1741 infants in hospital) with a statistically significant difference in overall breastfeeding initiation rates in units that passed the appraisal (88.1% vs. 78.1%,  $P < 0.001$ ). Of the BFHI 10 steps, steps 7, 1 and 2 were found to be the most important for passing the appraisal.

The study by Dulon *et al.* (2003) included two components, firstly a cross-sectional survey of breastfeeding promotion in a random sample of 345 hospitals in Germany, of which 177 agreed to take part in breastfeeding promotion. A breastfeeding promotion index was used with 10 indicators, which for the most part were identical to the BFHI 10 steps. Secondly, a survey of 1487 mothers who were interviewed by telephone at 14 days post-birth with follow-up questionnaires sent at 2, 4, 6, 9 and 12 months. The index of BFHI steps compared those who had given birth in a hospital with more than five steps in place with those with less than five steps was used. No statistically significant difference was found between the two groups in breastfeeding initiation rates at birth. Obstetric and demographic details were found to have a greater influence on breastfeeding outcomes.

Rosenberg *et al.* (2008) undertook a large cohort study that included 57 hospitals in OR, United States. The study compared compliance with BFHI to determine whether the level of hospital implementation of any or all of the 10 steps of BFHI influenced the

percentage of women breastfeeding. A score of 1 to 10 was allocated to each of the BFHI 10 steps, with a total score out of 100 used to indicate the level of breastfeeding support. There were no data on the number of infants; however, it was reported that increases in the offer of overall breastfeeding support were associated with increases in the percentage of women breastfeeding at 2 days post-birth which was used as a proxy for initiation. Wright *et al.* (1996) interviewed 192 women on a post-natal ward prior to the introduction of BFHI policies, and interviewed 392 women following the introduction of BFHI policies, although the unit had not achieved BFHI accreditation. There was no statistically significant difference in breastfeeding initiation between the two groups.

Three studies (Wagner *et al.* 2002; Coutinho *et al.* 2005; Shinwell *et al.* 2006) assessed if staff training impacted on increased breastfeeding initiation, although none of the units in these studies had achieved BFHI accreditation. A study from Brazil (Coutinho *et al.* 2005) compared BFHI-based training of maternity staff with a combined hospital-based and community-based intervention to assess impact on rates of exclusive breastfeeding from birth to 6 months. Training that was based on the BFHI and the WHO/UNICEF Breastfeeding Counselling Course was implemented at two maternity units that served women in areas of high socio-economic deprivation in February 2001. Data on exclusive and partial breastfeeding rates in hospital following the training intervention were presented. The hospital-training intervention achieved a high rate of exclusive breastfeeding in hospital on day 1 (70% of 350 infants) compared with 21% of 364 infants ( $P < 0.0001$ ) born in the same hospitals in 1998 and an increase in partial breastfeeding on day 1 (81% vs. 70%  $P < 0.009$ ). Shinwell *et al.* (2006) in a cohort study from Israel, which assessed breastfeeding initiation pre- (471 mother–infant pairs) and post- (364 mother–infant pairs) introduction of a 32-h training programme (not based on BFHI) targeting hospital nursery staff and midwives, found a significant difference in initiation following introduction of the programme (84% vs. 93%,  $P < 0.0001$ ). Wagner *et al.* (2002) in a large cohort study undertaken in an urban medical centre in the

United States undertook a notes review of breastfeeding initiation following the introduction of an educational programme targeted at staff and parents, with data on 4315 mother–infant pairs pre-intervention and 8721 post-intervention. There was a significant difference in breastfeeding initiation (816/18.9% vs. 4107/47.1%,  $P < 0.0001$ ) following the introduction of the programme.

### **Breastfeeding up to 1 week/discharge from hospital**

Six studies evaluated breastfeeding rates up to 1 week post-birth, during the hospital stay or at discharge from hospital (Zimmerman 1999; Cattaneo & Buzzetti 2001; Tappin *et al.* 2001; Labarere *et al.* 2003; Gau 2004; Broadfoot *et al.* 2005). Five of the studies showed an increase in breastfeeding, while one study found no statistically significant difference in the overall breastfeeding rate, but did find an increase in the rate of exclusive breastfeeding. Four of the studies looked at exclusive breastfeeding rates in hospital (Zimmerman 1999; Cattaneo & Buzzetti 2001; Labarere *et al.* 2003; Gau 2004), and all four reported increased rates of exclusive breastfeeding (see Table 2).

Broadfoot *et al.* (2005) and Tappin *et al.* (2001) conducted large cohort studies in Scotland using routine data collected on all babies at 7 days following birth. Broadfoot *et al.* (2005) compared all babies born in either a BFHI-accredited hospital or not between 1995 and 2002, and Tappin *et al.* (2001) measured change in prevalence of breastfeeding at around 7 days post-birth between 1990/1991 and 1997/1998. Both studies showed an increase in the rate of breastfeeding in accredited BFHI hospitals. Broadfoot *et al.* (2005) showed that babies born in a hospital with the BFHI award were 28% ( $P < 0.001$ ) more likely to be exclusively breastfed at seven days post-natal than those born in other maternity units after adjustment for mother's age, deprivation score, hospital size and year of birth. Tappin *et al.* (2001) found a 6.4% overall increase over the 8-year period (95% CI, 6.0–6.8) which remained as a 3.8% difference when data were adjusted for maternal age. Prevalence of breastfeeding at BFHI-accredited hospitals improved over time by 8.1% (95% CI, 7.0–9.2) compared with 6.1% in

hospitals with a certificate of commitment (95% CI, 5.2–7.0).

Gau (2004) compared the breastfeeding rates of babies born in seven hospitals in Taiwan with a Lactation Intervention Programme (3327 women) established in accordance with the BFHI 10 steps, although units were not BFHI accredited, with those in five units without a programme (1254 women). The study aimed to compare breastfeeding attitudes and knowledge and breastfeeding initiation and duration to assess the effects of the lactation programme over a 3-year period. There was a statistically significant increase in year on year breastfeeding rates in hospitals that had the lactation programme ( $P < 0.0001$ ). The overall breastfeeding rate increased from 92% to 95% over 3 years in units with the programme ( $P < 0.001$ ), and the exclusive breastfeeding rate increased in these units from 30% to 50% ( $P < 0.001$ ).

Zimmerman (1999) compared baseline breastfeeding rates on 188 infants in one inner city clinic in the United States with data on 405 infants whose mothers had received breastfeeding education antenatally and additional support antenatally and post-natally over a 2-year period, an intervention not based on the BFHI model. There were increased rates of breastfeeding initiation following the intervention (36% to 66%,  $P < 0.05$ ). Most of the women were from low-income, minority ethnic groups, including women who were recent immigrants to the United States.

Two studies (Cattaneo and Buzzetti 2001; Labarere *et al.* 2003) assessed if training of health professionals increased breastfeeding rates at discharge from hospital. Cattaneo and Buzzetti (2001) undertook a non-randomised controlled study with data collected over three phases to assess the impact of the roll out of an adapted 18-h BFHI training course, augmented with a 2-h WHO counselling training session. Eight hospitals in Italy that agreed to participate in the study were allocated to one of two groups, each with three general hospitals and one teaching hospital and with similar catchment areas. Following an initial assessment (phase 1), training of health professionals commenced in group 1 following training of the trainers to cascade the intervention. A second assessment was then conducted (phase 2), following which health professional training commenced in three hospitals in

group 2. A third and final assessment was then conducted as part of phase 3. The rates of exclusive breastfeeding at hospital discharge increased significantly after training [odds ratio (OR) 6.78, 95% CI 5.65–8.14]. The other study (Labarere *et al.* 2003) was relatively small ( $n = 73$ ) and assessed outcomes of a 3-day staff training programme that did not include an antenatal component. There was a statistically significant increase in exclusive breastfeeding at discharge from hospital.

### Breastfeeding after hospital discharge up to 2 months

Nine studies evaluated breastfeeding outcomes from hospital discharge to 2 months post-partum. Of these, four studies assessed breastfeeding outcomes at 2 weeks post-partum (Zimmerman 1999; Gau 2004; Duyan Camurdan *et al.* 2007; Rosenberg *et al.* 2008). Six studies included data on breastfeeding outcomes at 1 month (Bartington *et al.* 2006, Lutter *et al.* 1997; Braun *et al.* 2003; Weng *et al.* 2003; Gau 2004; Coutinho *et al.* 2005) and two studies looked at breastfeeding at 2 months (Gau 2004; Duyan Camurdan *et al.* 2007). Studies included a range of outcomes including exclusive, mixed and any breastfeeding. Four of the studies showed higher rates of breastfeeding at 1 month (Lutter *et al.* 1997; Braun *et al.* 2003; Weng *et al.* 2003; Gau 2004); however, two found no statistically significant differences in breastfeeding at this time (Bartington *et al.* 2006, Coutinho *et al.* 2005). One study showed higher rates of breastfeeding at 2 months (Gau 2004), and three studies showed higher rates of breastfeeding at 2 weeks (Zimmerman 1999; Gau 2004; Rosenberg *et al.* 2008) (see Table 3).

Bartington *et al.* (2006) showed that when comparing infants born in a BFHI-accredited unit with those born in a unit without BFHI status, after adjustment for social, demographic and obstetric factors, they were not more likely to be breastfed at 1 month. Of the two Taiwanese studies described previously (Gau 2004, Weng *et al.* 2003), both reported higher rates of breastfeeding at 1 month in women who had given birth at units that had implemented changes to support breastfeeding in line with BFHI. Gau (2004) also showed significantly higher exclusive breastfeed-

ing rates at 2 weeks, 1 month and 2 months post-birth. Braun *et al.* (2003) was a smaller study (437 infants in total) that compared the breastfeeding rates pre- and 2 years post-implementation of BFHI. There were higher rates of breastfeeding after the implementation of BFHI, with a stronger effect in an underprivileged population. Lutter *et al.* (1997), a relatively small prospective cohort study (442 women), compared the exclusive breastfeeding rates of women at two hospitals, one of which had a breastfeeding promotion programme. There was an increase in exclusive breastfeeding at 1 month (64% vs. 39%).

The third stage of the study by Coutinho *et al.* (2005) was a RCT to compare the impact on breastfeeding outcomes following a RCT of post-natal support visits compared with no visits, with researchers blinded to group allocation. There were no statistically significant differences between the two groups at 1 month, although a significant difference was found with a sub-group who had home visits post-natally.

A large cohort study by Rosenberg *et al.* (2008) (see 'Initiation of Breastfeeding' for more details) showed increased hospital breastfeeding support resulted in significant increases in the percentage of women still breastfeeding at 2 weeks. Zimmerman (1999) found that the proportion of women still breastfeeding at 2 weeks post-partum increased from 35% based on their baseline data to 57% based on outcomes following their education and support intervention, a statistically significant difference ( $P < 0.05$ ).

Duyan Camurdan *et al.* (2007) undertook a study to evaluate the effects of BFHI on breastfeeding outcomes pre- and post-implementation of the initiative at one hospital in Turkey. Breastfeeding outcomes during the first 6 months post-birth and beyond were compared among babies born during November 2001 to February 2002 (258 infants) and those born during November 2002 and February 2003 (297 infants). Data were collected from follow-up visits with paediatric staff up until the infant was 2 years of age. At the 2-week and 2-month follow-up, exclusive breastfeeding rates were higher in the after-BFHI group, but differences were not statistically significant.

### Breastfeeding after 2 months to 5 months

Four studies evaluated breastfeeding outcomes at 4 months (Braun *et al.* 2003; Dulong *et al.* 2003; Caldeira & Goncalves 2007; Duyan Camurdan *et al.* 2007) and three studies at 3 months (Cattaneo & Buzzetti 2001; Kramer *et al.* 2001; Merten *et al.* 2005). All studies showed an increase in breastfeeding rates at 3 and 4 months except Duyan Camurdan *et al.* (2007) where the difference at 4 months was not statistically significant (see Table 4).

Kramer *et al.* (2001) in a large RCT (the Promotion of Breastfeeding Intervention Trial) in Belarus compared an intervention modelled on BFHI with no BFHI model in a cluster RCT; units (clusters) were randomised to the intervention ( $n = 16$  sites) or to the control ( $n = 15$  sites). Nearly twice as many women in the intervention clusters were predominantly breastfeeding at 3 months (51.9 vs. 28.3%; adjusted OR, 0.28; 95% CI, 0.16–0.49), and the proportion of women exclusively breastfeeding at 3 months was significantly higher in the intervention clusters (43.3% vs. 6.4%;  $P < 0.001$ ).

Cattaneo & Buzzetti (2001) described earlier found significantly increased rates of full (defined as exclusive plus predominant) breastfeeding at 3 months (37% to 50% in group 1 vs. 40% to 59% in group 2). Full breastfeeding at 3 months was significantly associated with exclusive breastfeeding at discharge (OR 1.96; 95% CI 1.63 to 2.36) and previous experience of breastfeeding (OR 1.58 95% CI 1.34 to 1.87); training health workers had a positive but non-significant association (OR 1.20, 95% CI 1.00 to 1.44,  $P < 0.0543$ ).

Merten *et al.* (2005) in a national study of prevalence and duration of breastfeeding in Switzerland compared infants born to a random sample of mothers who had given birth in BFHI designated hospitals with infants born to mothers in units that had not then achieved BFHI accreditation. The proportion of fully breastfed infants at 0 to 3 months of age (72% vs. 60%,  $P < 0.012$ ) and 0 to 5 months (51% vs. 42%  $P < 0.015$ ) was increased in BFHI units. The proportion of exclusively breastfeeding babies between 0 and 3 months (60% vs. 49%,  $P < 0.033$ ) and 0 to 5 months (42% vs. 34%,  $P < 0.022$ ) was also increased.



Braun *et al.* (2003) followed a cohort of healthy term singleton babies born in 1994 ( $n = 187$ ), and a cohort born in 1999 ( $n = 250$ ), 2 years after the introduction of BFHI. There were statistically significant differences in the two groups in age and marital status of the mother and the per capita income for the family. A Cox regression analysis showed the hazard ratio was 1.55 (95%CI, 1.16 to 2.07) for discontinuation of any breastfeeding at 4 months, indicating that implementation of BFHI resulted in increased breastfeeding duration, the effects being stronger for women with lower income. The authors noted that as the study evaluated breastfeeding rates over two different time periods and breastfeeding rates were gradually increasing in Brazil, it was possible that greater awareness could have influenced breastfeeding outcomes rather than the introduction of BFHI.

Caldeira & Goncalves (2007) in another study from Brazil showed an increase in duration of exclusive breastfeeding at 4 months. Findings were based on breastfeeding indicator studies before and after the BFHI had been implemented in three hospitals in the city of Montes Claros. Data were available for 494 infants and 1240, respectively aged 4–24 months. Kaplan–Meyer survival curves were constructed for the different degrees of breastfeeding before (1996) and after (2004) implementation of the BFHI. Median exclusive breastfeeding duration increased from 27 days in 1996 to 3.5 months in 2004. Log rank tests demonstrated differences between the two curves were statistically significant ( $P < 0.000$ ). Dulon *et al.* (2003) described under initiation of breastfeeding showed a statistically significant increase in full breastfeeding at 4 months (42.1% vs. 49.5%,  $P < 0.005$ ).

### Breastfeeding at 6 months

Five studies evaluated breastfeeding at 6 months (Cattaneo & Buzzetti 2001; Kramer *et al.* 2001; Dulon *et al.* 2003; Shinwell *et al.* 2006; Duyan Camurdan *et al.* 2007). Four studies showed increases in breastfeeding rates (including any and/or exclusive breastfeeding), and one study found no difference in exclusive breastfeeding rates (Duyan Camurdan *et al.* 2007) (see Table 5).

Kramer *et al.* (2001) in the cluster RCT described earlier under breastfeeding up to 5 months compared a BFHI model with no model. At 6 months, nearly seven times as many women in the intervention clusters were predominantly breastfeeding (10.6% vs. 1.6%,  $P < 0.003$ ), and the proportion of women exclusively breastfeeding was more than 12-fold higher (7.9% vs. 0.6%;  $P = 0.01$ ) among women in the intervention compared with the control clusters. Cattaneo & Buzzetti (2001) also described earlier showed a significant increase in any breastfeeding at 6 months (43% to 62% in group 1 vs. 41% to 64% in group 2). The increase was significantly associated only with full breastfeeding at 3 months (OR 12.83 95% CI, 10.32 to 15.95) and with exclusive breastfeeding at discharge (OR 1.33 95% CI, 1.07 to 1.65). Dulon *et al.* (2003) described earlier showed a significant association with full breastfeeding at 6 months. Shinwell *et al.*'s (2006) small pre- and post-intervention study conducted in Israel that compared breastfeeding rates following an intervention of a 32-h staff training programme found a statistically significant difference in exclusive breastfeeding outcomes at 6 months post-birth. In contrast, Duyan Camurdan *et al.* (2007) showed no statistically significant difference in exclusive breastfeeding rates at 6 months (9.8% vs. 9.3%).

### Duration of exclusive breastfeeding

Exclusive breastfeeding rates were described in 13 of the included studies (Wright *et al.* 1996; Lutter *et al.* 1997; Zimmerman 1999; Cattaneo & Buzzetti 2001; Kramer *et al.* 2001; Philipp *et al.* 2001; Tappin *et al.* 2001; Braun *et al.* 2003; Labarere *et al.* 2003; Weng *et al.* 2003; Gau 2004; Coutinho *et al.* 2005; Caldeira & Goncalves 2007). Four studies evaluated the duration of exclusive breastfeeding (Lutter *et al.* 1997; Braun *et al.* 2003; Merten *et al.* 2005; Caldeira & Goncalves 2007). All four showed an increase in duration of exclusive breastfeeding. Merten *et al.* (2005) showed a median duration of exclusive breastfeeding of 12 weeks compared with 6 weeks. Braun *et al.* (2003) showed babies born in the 1999 cohort were breastfed for significantly longer within the first 6 months of birth ( $P < 0.01$ ) with an increase of exclusive breastfeeding from 1 month to 2 months; Caldeira & Gon-



calves 2007 with an increase from 27 days to 3.5 months; and Lutter *et al.* (1997) with an increased median duration of 22 days to 75 days. However, Coutinho *et al.* (2005) described the high rates of exclusive breastfeeding in hospital as short lived with only 15% of women exclusively breastfeeding at 1 month.

### Systematic reviews of breastfeeding

Of 34 studies included in the Cochrane Library review of extra support for breastfeeding mothers (Britton *et al.* 2007), one study (Kramer *et al.* 2001) is included in the current review. A systematic review by Fairbank *et al.* (2000) of interventions to promote the initiation of breastfeeding included 59 studies of which 26 were published prior to 1992 (and excluded from the current review). Of studies published from 1992 onwards, only one (Lutter *et al.* 1997) is included in the current review. The review by Spiby *et al.* (2009) of the effect of training, education and practice interventions of health professionals and lay counsellors on breastfeeding duration also included one study (Cattaneo & Buzzetti 2001) selected for this review. Six studies (Fairbank *et al.* 2000; Kramer *et al.* 2001; Philipp *et al.* 2001; Dulon *et al.* 2003; Labarere *et al.* 2003; Merten *et al.* 2005) described earlier were also included in Hannula's review of interventions to support breastfeeding, and the systematic review that informed the National Institute for Health and Clinical Excellence (NICE) post-natal care guidance (2006) included five studies selected for the current review (Fairbank *et al.* 2000; Cattaneo & Buzzetti 2001; Philipp *et al.* 2001; Labarere *et al.* 2003; Broadfoot *et al.* 2005).

Britton *et al.* (2007) in a Cochrane Library systematic review assessed the effectiveness of support for breastfeeding mothers. Data on 29 385 mother–infant dyads were included from 34 trials. The review considered trials examining lay or professional support. All forms of extra support analysed together showed an increase in duration of 'any breastfeeding' [relative risk (RR) for stopping any breastfeeding before 6 months 0.91, 95% (CI) 0.86 to 0.96]. All forms of extra support together had a larger effect on duration of exclusive breastfeeding than on any breastfeeding

(RR 0.81, 95% CI 0.74 to 0.89). Lay and professional support together extended duration of any breastfeeding significantly (RR before 4–6 weeks 0.65, 95% 0.51 to 0.82; RR before 2 months 0.74, 95% CI 0.66 to 0.83). Exclusive breastfeeding was significantly longer with use of WHO/UNICEF training (RR 0.69, 95% CI 0.52 to 0.91). Women who received any form of support were less likely to give up exclusive breastfeeding before 5 months.

Fairbank *et al.* (2000) in a systematic review evaluated the effectiveness of interventions to promote the initiation of breastfeeding. The review included 29 before and after studies, 14 RCTs and 16 non-RCTs. Interventions were grouped into health education, health sector initiatives including BFHI, peer support, media campaigns and multifaceted interventions. Findings associated with increased initiation and duration of breastfeeding included institutional changes to hospital practices either as part of or independent of BFHI (particularly in developing countries) and use of peer support as a stand-alone intervention for women in low-income groups who wanted to breastfeed. Social support interventions and use of literature alone had limited impact, and training programmes did not result in a significant change in the attitudes of staff or breastfeeding rates.

Spiby *et al.* (2009) undertook a systematic review of education and evidence-based practice interventions with health professionals and breastfeeding counsellors. The review included nine papers, all of which were before and after studies and all included education of health professionals; no studies related to breastfeeding counsellors. One included study (Cattaneo & Buzzetti 2001) is described earlier in this review. Studies were described as having methodological limitations, varied settings and context and lacked comparability. The review authors concluded that there was insufficient evidence to draw conclusions on overall benefits or harm of interventions, and there seemed to be no single way to consistently achieve change in breastfeeding duration. One study deemed to be more methodologically robust indicated that BFHI may have the potential to influence breastfeeding duration.

Hannula *et al.* (2008) in a systematic review of professional support interventions for breastfeeding

during pregnancy, in hospital following birth and during the post-natal period included 36 papers of which six are included in this review (Fairbank *et al.* 2000; Kramer *et al.* 2001; Philipp *et al.* 2001; Dulong *et al.* 2003; Labarere *et al.* 2003; Merten *et al.* 2005). The review concluded that interventions persisting from pregnancy to intra-partum care and throughout the post-natal period were more effective than interventions that focused on a shorter time period. Multifaceted intervention packages which included education and support from 'well trained' professionals were more effective than single interventions.

The NICE guideline for routine post-natal care in England and Wales (NICE 2006) included a section on infant feeding (breast and artificial milk feeding) with recommendations for practice based on a systematic review that considered evidence on a range of environmental factors to facilitate successful breastfeeding (DeMott *et al.* 2006). The guideline recommendations included advice on timing of provision of information and advice to support infant feeding (first 24 h, 2–7 days, 2–8 weeks). With respect to the role of environmental factors, including use of structured training programmes such as BFHI, six papers were included in the NICE systematic review, five (Fairbank *et al.* 2000; Cattaneo & Buzzetti 2001; Philipp *et al.* 2001; Labarere *et al.* 2003; Broadfoot *et al.* 2005) of which were appraised and reported individually in the current review. One paper (Digirolamo *et al.* 2001) was excluded from the current review. The NICE guideline recommends that all maternity care providers should implement an externally evaluated structured programme that encourages breastfeeding, using BFHI as a minimum standard.

## Secondary outcomes

### *Maternal and infant health outcomes*

No studies included data on maternal health outcomes. Potential confounding factors for not breastfeeding or for early cessation of breastfeeding as a result of maternal morbidity were not considered. Main trial outcomes in the RCT by Kramer *et al.* (2001) included infant health outcomes. Intervention

site infants who were significantly more likely than control infants to be breastfed to any degree had a significant reduction in the risk of one or more gastrointestinal tract infections (9.1% vs. 13.2%; adjusted OR 0.60; 95% CI, 0.40–0.91) and atopic eczema (3.3% vs. 6.3%; adjusted OR 0.54; 95% CI, 0.31–0.95), but no significant reduction in respiratory tract infection (intervention group, 39.2%; control group, 39.4%; adjusted OR 0.87; 95% CI, 0.59–1.28).

### *Women's knowledge, attitudes and skills following introduction of a structured programme*

One study (Gau 2004) showed that the women in the lactation intervention programme scored higher in breastfeeding knowledge than the control group and had a more positive attitude towards breastfeeding ( $P < 0.05$ ). These outcomes were assessed using previously developed questionnaires that were tested for their reliability and validity prior to being used in the study; The Breastfeeding Attitude Questionnaire developed by Teng *et al.* (1994) and the Breastfeeding Knowledge Questionnaire developed by Chen (1998).

### *Staff knowledge, attitudes and skills following introduction of a structured programme*

Only one included study reported data on the impact of training on staff outcomes. Cattaneo & Buzzetti (2001) reported an increase in health professional's knowledge after participation in the 18-h BFHI training programme but did not describe the tool used to measure this or present raw data. A total of 571 trainees were asked to complete a self-administered questionnaire with eight questions on knowledge and professional characteristics. Responses from both groups were low. Mean scores were weighted by age, year of graduation and years working in the same position increased from 0.41 to 0.66 to 0.72 in group 1 and from 0.53 to 0.53 to 0.75 in group 2 at the three phases, respectively.

### *Women's experiences of support (professional and peer) for breastfeeding*

One study (Wright *et al.* 1996) reported that following the introduction of a breastfeeding policy in line with

the 10 steps to successful breastfeeding, women received more breastfeeding help from hospital staff (81.9% vs. 61.3%,  $P < 0.00001$ ); however, as described earlier, there was no significant difference in breastfeeding rates.

#### *Reported breastfeeding problems*

Labarere *et al.* (2003) included data on problems reported during the hospital stay, although numbers were very small ( $n = 25$ ) and it is difficult to draw conclusions. Problems included 'baby crying' (before training programme 0/after 5), 'baby sleeping' (4/2), 'nipple pain' (3/1), 'baby refused breast' (3/4), 'insufficient lactation' (1/0), 'insufficient weight increase' (1/1), 'nipple cracks' (2/0) and other (13/8), data on which were not presented. Small numbers and retrospective data collection mean findings should be interpreted with caution.

#### *Impact on health care resources*

There was very little evidence presented of impact of structured compared with non-structured programmes on health care resources. Zimmerman (1999) did not undertake a formal economic evaluation and only considered financial costs required to develop and implement the discharge packs, which were considered to be minimal.

The NICE post-natal care guideline (NICE 2006) included a modelling exercise to assess the cost-effectiveness of universal implementation of the BFHI across England and Wales. The model included costs of planning, accreditation and follow-up payments to the BFHI organisation, the appointment of a breastfeeding co-ordinator in each maternity unit and costs of training clinical staff. As no relevant economic data were identified from primary studies, the model was informed by routine data from eight UK maternity units that had achieved BFHI accreditation. Cost savings were assessed on an increase in breastfeeding rates (the model assumed an improvement rate of 10%) and reductions in infant gastroenteritis and otitis media. The model also included cost savings on formula and teats because of increased breastfeeding. The conclusion was that implementa-

tion of BFHI in NHS units in England and Wales was highly likely to result in cost savings after implementation over a 15-year period, assuming that all units immediately implemented the strategy, with a greater level of costs in the earlier years.

#### *Impact on policy*

No primary research papers were identified which considered impact of structured compared with non-structured programmes and impact on policy at a local, national or international level.

## **Discussion**

A narrative presentation has been undertaken of the evidence to support use of structured compared with non-structured programmes introduced into acute maternity care settings to support the initiation and duration of exclusive and any breastfeeding an area not previously addressed in a systematic review. Twenty-six studies were included, presenting data from a number of high, middle-income and developing countries. Five systematic reviews were included, one RCT, two non-controlled randomised studies, 15 cohort studies, one cross-sectional study and two descriptive studies. Much of the evidence identified from the primary research studies is low in the evidence hierarchy (level 4) based on criteria used to inform evidence appraisal by The Joanna Briggs Institute (2008). Nine of the 21 primary studies included in this review were included in the five previous systematic reviews, although most reviews only included one or two of the studies considered here. Most studies found an improvement in initiation of breastfeeding following introduction of a structured breastfeeding programme compared with no programme. The impact of introducing a structured programme on the duration of any breastfeeding and duration of exclusive breastfeeding was also evident, although not all studies reported a statistically significant difference in these outcomes.

Limitations of the review should be considered. There were few well designed RCTs, and many studies did not control for potential confounding factors. A wide variety of definitions of breastfeed-

ing outcome were used and a number of study end points included. There were also inconsistencies in the timing of assessments across the studies. The reporting of studies was often not comprehensive, lacking for example, in terms of details of the training and qualifications of the clinicians involved, the definitions used to describe the extent of breastfeeding and in the description of adherence to the intervention protocol. There was also a failure to present details of the content of the intervention implemented as part of a structured programme, or conversely, care received by groups who received standard care.

Few of the primary research studies presented data on secondary outcomes of interest that may reflect difficulties with obtaining data on breastfeeding outcomes once women and their babies have been discharged home. It also calls into question if structured programmes are more likely to influence breastfeeding outcomes in certain groups of women or are effective at reducing breastfeeding problems associated with early cessation of breastfeeding. Evidence from the economic modelling exercise completed for the NICE guideline on post-natal care in England and Wales (2006) suggested implementation of the BFHI model would result in cost savings over time for the UK NHS. However, further evidence from clinical studies in other country settings is required to demonstrate the level of resource savings that may be achieved and which elements of a structured programme are more likely to influence savings. Studies should also collate data following discharge from acute maternity care and impact on use of primary health care services.

Increased breastfeeding initiation and duration, including duration of exclusive breastfeeding, were found in studies that had implemented structured programmes such as the BFHI or programmes developed locally that did not reflect the BFHI content or following the introduction of specific steps of the BFHI model. It may be that not all the 10 steps of the BFHI model are needed to increase breastfeeding initiation and duration although at this stage the single importance of any one step is unclear. The evidence from studies in different country settings suggest that adherence to the BFHI 10 steps differed

because of their health systems and organisation, as well as cultural influences. Although structured programmes improved the initiation of breastfeeding in a hospital setting in most included studies, the impact on duration was less clear which again may reflect the need to consider the wider range of influences relating to decisions about infant feeding methods. At 1 month post-birth in the Bartington *et al.* study (2006) from the United Kingdom, one of the largest studies included, there was no increase in duration of breastfeeding at 1 month post-birth following implementation of BFHI. This was also the finding of studies by Coutinho *et al.* (2005) in Brazil and Cattaneo & Buzzetti (2001) in Italy. These findings may reflect socio-cultural determinants of breastfeeding and lack of health service provision for women once they leave the hospital, which a structured programme in an acute unit is less able to influence. It is not conclusive from this review if implementation of the BFHI supports sustained exclusive breastfeeding to 6 months, the period currently recommended by WHO (2003) and if other strategies, which cover both acute and community health care settings, such as the UK UNICEF Seven Point Plan for Sustaining Breastfeeding in the Community, as well as those that target education and social policy could lead to better breastfeeding outcomes. Although not a focus of this review, evaluation of the community health award of BFI is warranted particularly in settings where there is already a high uptake of breastfeeding.

## Conclusions

Most studies found a statistically significant improvement in breastfeeding initiation following introduction of a structured breastfeeding programme, although effect sizes varied and few studies controlled for any potential confounding factors. Despite poor overall study quality, structured programmes compared with standard care positively influenced the initiation and duration of any breastfeeding including exclusive breastfeeding. In health care settings with low breastfeeding uptake and duration rates, structured programmes may have a greater benefit. Of the small number of trials identified, limited information on the process of implementa-

tion of the intervention described makes replication difficult, and it was not possible to assess if differences in breastfeeding outcomes were similar across different country settings. The cost-effectiveness of structured compared with non-structured programmes was not considered in most of the included studies, an important omission given current demands on finite health care resources and is an issue that future studies should address.

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## Conflicts of interest

The authors declare that they have no conflicts of interest.

## Contributions

DB and SB developed and designed the review. SB and DB were the primary and secondary reviewers with support from CP. DB and SB wrote the first draft; all authors contributed to subsequent drafts and approved the final version.

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